RCRA FACILITY INVESTIGATION
SCOPE OF WORK

PURPOSE

The purpose of this RCRA Facility Investigation ("RFI") is to determine the nature and extent of releases of hazardous wastes or hazardous constituents from regulated units, solid waste management units, and other source areas at the facility, and to gather all necessary data to support the environmental indicator determinations and a Corrective Measures Study. The RFI includes the collection of site specific data to evaluate any human health and/or ecological impacts of contamination from the site. The Respondent shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RCRA facility investigation.

SCOPE

The RCRA Facility Investigation consists of four tasks:

TASK I: DESCRIPTION OF CURRENT CONDITIONS

A. Facility Background
B. Nature and Extent of Contamination
C. Implementation of Interim Measures
D. Environmental Indicator Assessment

TASK II: RFI WORKPLAN REQUIREMENTS

A. Project Management Plan
B. Data Collection Quality Assurance Project Plan
C. Data Management Plan
D. Community Relations Plan

TASK III: RCRA FACILITY INVESTIGATION

A. Environmental Setting
B. Source Characterization
C. Contamination Characterization
D. Potential Receptor Identification
E. Risk Assessment
F. Data Analysis

TASK IV: REPORTS

A. Description of Current Conditions
B. RFI Workplan
C. RFI Report
D. Progress Reports

TASK I: DESCRIPTION OF CURRENT CONDITIONS

The Respondent shall submit for EPA approval a report providing the background information pertinent to the facility. This report shall include information gathered during any previous investigations, inspections, interim measure activities and any other relevant data, which helps to identify potential sources of contamination and characterize the current site conditions. In addition, this report shall include an environmental indicator assessment to evaluate potential current human exposures to contamination and to assess whether any contaminated groundwater plumes are migrating.

A. Facility Background

The Respondent's report shall summarize the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage, or disposal of solid and hazardous waste. The Respondent's report shall include:

1. Map(s) depicting the following:

   a. General geographic location;

   b. Property lines, with the owners of all adjacent property clearly indicated;

   c. Topography (with a contour interval of 10 feet and a scale of 1 inch = 100 feet), waterways, all wetlands, floodplains, water features, drainage patterns;

   d. All tanks, buildings, utilities, paved areas, easements, rights-of-way, and other features;

   e. All solid or hazardous waste treatment, storage, or disposal areas active after November 19, 1980;

   f. All known past solid or hazardous waste treatment, storage, or disposal areas and all known spill, fire, or other accidental release locations

regardless of whether they were active on November 19, 1980;

g. All known past and present product and waste underground tanks or piping;

h. Surrounding land uses (residential, commercial, agricultural, recreational); and

i. Location of all production and ground water monitoring wells at and in the vicinity of the site. These wells shall be clearly labeled. Ground and top of casing elevations shall be included (these elevations may be included as an attachment).

All maps shall be consistent with the requirements set forth in 40 C.F.R. Section 270.14 and be of sufficient detail and accuracy to locate and report all current and future work performed at the site;

2. History and description of ownership and operation; solid and hazardous waste generation; and treatment, storage, and disposal activities at the facility;

3. Approximate dates or periods of past product and waste spills, identification of the materials spilled, the amount spilled, the location of the spills, and a description of the response actions conducted (local, state, or Federal response units or private parties), including any inspection reports or technical reports generated as a result of the response; and

4. Summary of past permits requested and/or received, any enforcement actions and their subsequent responses.

B. Nature and Extent of Contamination

The Respondent's report shall describe the existing information on the nature and extent of contamination.

1. The Respondent's report shall summarize all possible source areas of contamination. This, at a minimum, should include all regulated units, solid waste management units, spill areas, and other suspected source areas of contamination. For each area, the Respondent shall identify the following:

a. Location of unit/area (which shall be depicted on a facility map);

b. Quantities of solid and hazardous wastes;

c. Hazardous waste or hazardous constituents, to the extent known; and

d. Identification of areas where additional information is necessary.

2. The Respondent shall prepare an assessment and description of the existing degree and extent of contamination. This should include:

a. Available monitoring data and qualitative information on locations and levels of contamination at the facility;

b. All potential migration pathways including information on geology, soils, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality; and

c. Potential impact(s) on human health and the environment, including demography, ground water and surface water use, and land use.

C. Implementation of Interim Measures

The Respondent's report shall document interim measures which were, or are, being undertaken at the facility. This report shall include:

1. Objectives of the interim measures: how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long-term solution at the facility;

2. Design, construction, operation, and maintenance requirements;

3. Schedules for design, construction, and monitoring; and

4. Schedule for progress reports.

D. Environmental Indicator Assessment

The Respondent shall assess whether the current data supports achievement of EPA's Environmental Indicators. The Respondent shall complete EPA's Environmental Indicator Assessment Forms which are included as Attachment G, and identify any information needed to complete the forms.

TASK II: RFI WORKPLAN REQUIREMENTS

The Respondent shall prepare a RCRA Facility Investigation Workplan. This RFI Workplan shall include several components described below. During the RCRA Facility Investigation, it

may be necessary to revise the RFI Workplan to increase or decrease the detail of information collected to accommodate the facility-specific situation. The RFI Workplan shall include the following:

A. Project Management Plan

The Respondent shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules, and personnel. The Project Management Plan will also include at a minimum:

1. a description of personnel qualifications performing or directing the RFI, including contractor personnel.

2. the overall management approach to the RCRA Facility Investigation

3. a proposed strategy to meet the Environmental Indicator goals.

B. Data Collection Quality Assurance Project Plan

The Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements, and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented.

1. The Data Collection Strategy section of the Data Collection Quality Assurance Project Plan shall include, but not be limited to, the following:

   a. Description of the intended uses for the data and of the necessary level of precision and accuracy for these intended uses;

   b. Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

   c. Description of the rationale used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

      i) Environmental conditions at the time of sampling;

      ii) Number of sampling points;

iii) Representativeness of selected media; and

iv) Representativeness of selected analytical parameters.

d. Description of the measures to be taken to assure that the following data sets can be compared to each other:

i) RFI data generated by the Respondent over some time period;

ii) RFI data generated by an outside laboratory or consultant versus data generated by the Respondent;

iii) Data generated by separate consultants or laboratories; and

iv) Data generated by an outside consultant or laboratory over some time period.

e. Details relating to the schedule of and information to be provided in quality assurance reports. The reports should include, but not be limited to:

i) Periodic assessment of measurement data accuracy, precision, and completeness;

ii) Results of performance audits;

iii) Results of system audits;

iv) Significant quality assurance problems and recommended solutions; and

v) Resolutions of previously stated problems.

2. The Sampling section of the Data Collection Quality Assurance Project Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;

b. Providing a statistically sufficient number of sampling sites;

c. Measuring all necessary ancillary data;

d. Determining conditions under which sampling should be conducted;

e. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of sampling and length of sampling period;

h. Selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;

i. Documenting field sampling operations and procedures, including:

i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters and adsorbing reagents);

ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

iii) Documentation of specific sample preservation method;

iv) Calibration of field devices;

v) Collection of replicate samples;

vi) Submission of field-biased blanks, where appropriate;

vii) Potential interferences present at the facility;

viii) Construction materials and techniques associated with monitoring wells and piezometers;

ix) Field equipment listing and sample containers;

x) Sampling order; and

xi) Decontamination procedures.

j. Selecting appropriate sample containers;

k. Sample preservation; and

l. Chain-of-custody, including:

i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. The Field Measurements section of the Data Collection Quality Assurance Project Plan shall discuss:

a. Selecting appropriate field measurement locations, depths, etc.;

b. Providing a statistically sufficient number of field measurements;

c. Measuring all necessary ancillary data;

d. Determining conditions under which field measurement should be conducted;

e. Determining which media are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of field measurement and length of field measurement periods; and

h. Documenting field measurement operations and procedures, including:

i) Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;

ii) Calibration of field devices;

iii) Collection of replicate measurements;

iv) Submission of field-biased blanks, where appropriate;

v) Potential interferences present at the facility;

vi) Construction materials and techniques associated with

monitoring wells and piezometers used to collect field data;

vii) Field equipment listing;

viii) Order in which field measurements will be made; and

ix) Decontamination procedures.

4. The Sample Analysis section of the Data Collection Quality Assurance Project Plan shall specify the following:

a. Chain-of-custody procedures, including:

i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, to obtain documents of shipment, and to verify the data entered onto the sample custody records;

ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

b. Sample storage;

c. Sample preparation methods;

d. Analytical procedures, including:

i) Scope and application of the procedure;

ii) Sample matrix;

iii) Potential interferences;

iv) Precision and accuracy of the methodology; and

v) Method detection limits.

e. Calibration procedures and frequency;

f. Data reduction, validation, and reporting;

g. Internal quality control checks, laboratory performance and systems audits, and frequency, including:

i) Method blank(s);

ii) Laboratory control sample(s);

iii) Calibration check sample(s);

iv) Replicate sample(s);

v) Matrix-spiked sample(s);

vi) "Blind" quality control sample(s);

vii) Control charts;

viii) Surrogate samples;

ix) Zero and span gases; and

x) Reagent quality control checks.

A performance audit may be conducted by EPA on the laboratories selected by the Respondent. If EPA requires, this audit must be completed and approved prior to the facility investigation.

h. Preventive maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turnaround time.

C. Data Management Plan

The Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This Plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

1. The data record shall include the following:

    a. Unique sample or field measurement code;

    b. Sampling or field measurement location and sample or measurement type;

    c. Sampling or field measurement raw data;

    d. Laboratory analysis identification number;

    e. Property or component measured; and

    f. Result of analysis (e.g., concentration).

2. Tabular displays shall be used to present the following data:

    a. Unsorted (raw) data;

    b. Results for each medium, or for each constituent monitored;

    c. Data reduction for statistical analysis;

    d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

    e. Summary data.

3. Graphical displays (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.) shall be used to present the following data:

    a. Display sampling location and sampling grid;

    b. Indicate boundaries of sampling area and areas where more data are required;

    c. Display levels of contamination at each sampling location for each sampling event;

    d. Display geographical extent of contamination;

    e. Display contamination levels, averages, and maxima;

f. Illustrate changes in concentration in relation to distance from the source, time, depth, or other parameters; and

g. Indicate features affecting intramedia transport and show potential receptors.

D. Community Relations Plan

The Respondent shall prepare a plan for the dissemination of information to the public regarding investigation activities and results. It shall also include a summary fact sheet for EPA to post on EPA's web site. At a minimum, Respondent shall provide EPA with an update to the fact sheet annually.

TASK III: FACILITY INVESTIGATION

The Respondent shall conduct investigations necessary to: characterize the facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of contamination (Contamination Characterization); identify actual or potential receptors, and determine the impact(s) of contamination on human health and/or ecological receptors (Risk Assessment). For reporting of the ecological assessment refer to "The Risk Assessment Volume II Manual," [EPA/540/1-89/002 and 001, March 1989].

The investigation should result in data of adequate technical quality to support an environmental indicator determination and the development and evaluation of the corrective measures alternative(s) during the Corrective Measures Study.

The site investigation activities shall follow the plans set forth in Task II. All sampling and analyses shall be conducted in accordance with the Data Collection Quality Assurance Project Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

The Respondent shall prepare an analysis and summary of the RCRA Facility Investigation. The report shall describe the nature and extent of contamination, potential threat(s) to human health and/or the environment, and shall support the Corrective Measures Study.

A. Environmental Setting

The Respondent shall collect information to supplement and verify existing information on the environmental setting at the facility. The Respondent shall characterize the following:

1. Hydrogeology - The Respondent shall conduct a program to evaluate hydrogeologic conditions at the facility. Such characterization typically includes, but is not limited to, the following information:

a. Description of the regional and facility-specific geologic and hydrogeologic characteristics affecting ground water flow beneath the facility, including:

   i) Regional and facility-specific stratigraphy: description of strata, including strike and dip, and identification of stratigraphic contacts;

   ii) Structural geology: description of local and regional structural features (e.g., folding, faulting, jointing);

   iii) Depositional and erosional history;

   iv) Identification and characterization of recharge and discharge areas;

   v) Regional and facility-specific ground water flow patterns;

   vi) Facility-specific ground water flow patterns in the saturated soil horizon, the shallow bedrock aquifer, and the deep bedrock aquifer systems; and

   vii) Characterization of seasonal variations in each ground water flow regime.

b. Analysis of any topographic features that might influence the ground water flow system.

c. Based on field data, tests, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i.e., the aquifers and any intervening saturated and unsaturated units), including:

   i) Hydraulic conductivity and porosity (total and effective);

   ii) Lithology, grain size, sorting, and degree of cementation;

   iii) Interpretation of hydraulic interconnections between saturated zones; and

   iv) Attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content, etc.).

d. Based on field studies and cores, structural geology and hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways, identify:

i) Sand and gravel deposits in unconsolidated deposits;

ii) Zones of fracturing or channeling in unconsolidated deposits;

iii) Zones of high permeability or low permeability that might direct and/or restrict the flow of contaminants;

iv) The uppermost aquifer: geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs; and

v) Water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration, including perched zones of saturation.

e. Based on data obtained from ground water monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source(s), a representative description of water level or fluid pressure monitoring, including:

i) Water-level contour and/or potentiometric maps;

ii) Hydrologic cross-sections showing vertical gradients;

iii) The flow system, including the vertical and horizontal components of flow; and

iv) Any temporal changes in hydraulic gradients, for example, due to seasonal influences.

f. Description of man-made influences that may affect the hydrogeology of the site, identifying:

i) Active and inactive local water supply and production wells with an approximate schedule of pumping; and

ii) Man-made hydraulic structures (pipelines, french drains,

ditches, unlined ponds, septic tanks, NPDES outfalls, retention areas, etc.).

2. Soils - The Respondent shall conduct a program to fully characterize the soil and rock units at the site. Such characterization typically includes, but is not limited to, the following information:

   a. Soil Conservation Service (SCS) soil classification;

   b. Surface soil distribution;

   c. Soil profile, including American Standard Test Method (ASTM) classification of soils;

   d. Transects of soil stratigraphy;

   e. Hydraulic conductivity (saturated and unsaturated);

   f. Relative permeability;

   g. Bulk density;

   h. Porosity;

   i. Soil sorptive capacity;

   j. Cation exchange capacity (CEC);

   k. Soil organic content;

   l. Soil pH;

   m. Particle size distribution;

   n. Depth of water table;

   o. Moisture content;

   p. Effect of stratification on unsaturated flow;

   q. Infiltration;

   r. Evapotranspiration;

s. Storage capacity;

t. Vertical flow rate; and

u. Mineral content.

3. Surface Water and Sediment - The Respondent shall conduct a program to characterize the surface water bodies in the vicinity of the facility. Such characterization typically includes, but is not limited to, the following information:

a. Description of the temporal and permanent surface water bodies including:

i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume;

ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment;

iii) For streams, ditches, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e., 100-year event); and

iv) Drainage patterns.

b. Description of the chemistry of the natural surface water and sediments (e.g. pH, total organic carbon).

c. Description of sediment characteristics, including:

i) Deposition area(s);

ii) Thickness profile; and

iii) Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH)

4. Air - The Respondent shall provide information characterizing the climate in the vicinity of the facility. Such characterization typically includes, but is not limited to, the following information:

a. Description of the following parameters:

i) Annual and monthly rainfall averages;

ii) Monthly temperature averages and extremes;

iii) Wind speed and direction; and

vi) Evaporation data.

b. Description of topographic and man-made features which affect air flow and emission patterns, including:

i) Ridges, hills, or mountain areas;

ii) Canyons or valleys;

iii) Surface water bodies (e.g., rivers, lakes, bays, etc.);

iv) Wind breaks and forests; and

v) Buildings.

B. Source Characterization

The Respondent shall collect analytical data to supplement and update the description prepared pursuant to Task I.B. herein. The data shall completely characterize the wastes and the areas where wastes have been placed or released. This information shall include quantification of the following specific characteristics at each source area and documentation of the procedures used to make the determinations.

1. Source Area Characteristics:

a. Location of unit/disposal or source area;

b. Type of unit/disposal area or cause of source/release;

c. Design features;

d. Operating practices (past and present);

e. Period of operation;

f. Age of unit/disposal area;

g. General physical condition; and

h. Method used to close the unit/disposal area.

2. Waste Characteristics:

a. Type of waste/product:

i) Hazardous classification (e.g., flammable, reactive, corrosive, oxidizing, or reducing agent);

ii) Quantity; and

iii) Chemical composition.

b. Physical and chemical characteristics:

i) Physical form and description (e.g., powder, oily sludge);

ii) pH;

iii) General chemical class (e.g., acid, base, solvent);

iv) Density;

v) Viscosity;

vi) Solubility in water;

vii) Cohesiveness of the waste; and

viii) Vapor pressure.

c. Migration and dispersal characteristics of the waste/product:

i) Sorption;

ii) Biodegradability, bioconcentration, biotransformation; and

iii) Chemical transformations.

C. <u>Contamination Characterization</u>

The Respondent shall collect analytical data on ground water, soils, surface water, sediment, and vapor contamination in the vicinity of the facility. This data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. The Respondent shall address the following types of contamination at the facility:

1. Ground Water Contamination - The Respondent shall conduct a ground water investigation to fully characterize all plumes of contamination at the facility and document the procedures used to characterize contaminant plume(s), (e.g., geophysics, modeling, pump tests, slug tests, nested piezometers). This investigation shall, at a minimum, provide the following information:

    a. Specific origin (source) of each contaminant plume;

    b. Description of the full horizontal and vertical extent of each immiscible or dissolved plume(s) originating from the facility;

    c. Horizontal and vertical direction of contaminant movement;

    d. Velocity of contaminant movement;

    e. Horizontal and vertical concentration profiles of hazardous constituents;

    f. Evaluation of factors influencing the plume movement; and

    g. Extrapolation of future contaminant movement.

2. Soil Contamination - The Respondent shall conduct and document the procedures used to investigate and characterize the contamination of the soil and rock units in the vicinity of any contaminant release. The investigation shall include the following information:

    a. Specific origin (source) of each soil contamination area;

    b. Description of the full vertical and horizontal extent of contamination;

    c. Description of contaminant and soil chemical properties within the contaminant source area and plume (e.g. contaminant solubility, adsorption, leachability) that might affect contaminant migration and transformation;

d. Specific contaminant concentrations;

e. Velocity and direction of contaminant movement; and

f. Extrapolation of future contaminant movement.

3. Surface Water and Sediment Contamination - The Respondent shall conduct and document the procedures used to investigate and characterize contamination in surface water bodies and sediments resulting from contaminant releases at the facility. The investigation shall include, but not be limited to, the following information:

a. Specific origin (source) of each contaminant release to surface water and sediments;

b. Description of likely discharge locations of any immiscible or dissolved plume(s) originating from the facility, and the extent of contamination in sediments and surface water;

c. Horizontal and vertical direction of contaminant movement;

d. Evaluation of the physical, biological, and chemical factors influencing contaminant movement;

e. Extrapolation of future contaminant movement; and

f. Description of the chemistry of the contaminated surface waters and sediments (e.g. pH, total dissolved solids, specific contaminant concentrations).

4. Vapor Contamination - The Respondent shall conduct and document procedures used to investigate and characterize the particulate and gaseous contaminants released into the atmosphere and gases emitted from any hazardous waste and hazardous constituents in the soils and ground water. This investigation shall provide the following information:

a. Specific origin (source) of each contaminant release to the air;

b. Description of the horizontal and vertical extent and velocity of contaminant movement;

c. Rate and amount of the release; and

d. Chemical and physical composition of the contaminants(s) released, including horizontal and vertical concentration profiles.

D. Potential Receptor Identification

The Respondent shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained. The following characteristics shall be identified:

1. Local uses and possible future uses of ground water:

   a. Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and

   b. Location of ground water users, including wells and discharge areas.

2. Local uses and possible future uses of surface waters near the facility:

   a. Type of use(s) (e.g. domestic municipal, recreational, agricultural) (e.g., potable and lawn/garden watering); and

   b. Location of designated use area relative to the site and the contamination.

3. Current and potential human use of or access to the facility and adjacent lands, including, but not limited to:

   a. Types of current and potential uses (e.g. residential, commercial, zoning/deed restrictions); and

   b. Any use restrictions relative to the site and the contamination.

4. A description of the ecology overlying and in proximity to the facility including, but not limited to:

   a. Location and size of each identified habitat (e.g., streams, wetlands, forested areas).

   b. Description and complete species listing of each habitat's plant and animal (both resident and transient) communities.

   c. Non-jurisdictional delineation of any wetlands present.

d. Database searches for the potential presence of any federal or state listed threatened, endangered, or rare species.

5. An evaluation of the pollutant impacts on the ecosystems/populations potentially exposed to contamination. This evaluation may be accomplished through the use of toxicity test (acute and chronic) population surveys and literature reviews.

6. A demographic profile of the people who use or have access to the facility and adjacent land, including, but not limited to: age, sex, and sensitive subgroups.

7. A description of the significance, uniqueness, or protected status of potentially exposed ecosystems.

E. Risk Assessment

The baseline risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (under the assumption of no action). The baseline risk assessment contributes to the site characterization and subsequent development, evaluation, and selection of appropriate response alternatives. There are several steps in the risk assessment process:

1. Human Health

a. Determine contaminants of concern: Data collection and evaluation involves gathering and analyzing the site data relevant to the human health evaluation and identifying the substances present at the site that are the focus of the risk assessment process.

b. Exposure assessment: Using the procedure outlined in Section D for determining potential receptors, estimate the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed. In the exposure assessment, reasonable maximum estimates of exposure are developed for both current and future land- and groundwater-use assumptions.

c. Toxicity assessment: This component of the risk assessment considers the types of adverse health effects associated with chemical exposures and the relationship between the magnitude of exposure and adverse effects.

d. Risk Characterization: This summarizes and combines outputs of the exposure and toxicity assessments to characterize baseline risk, both in

quantitative expressions and qualitative statements. An analysis of uncertainites that affect the level of confidence in the risk estimates should also be included. The analysis should specify the uncertainties associated with each of the four risk assessment steps, and should identify areas where a moderate amount of additional data might significantly improve the basis for selection of a remedial alternative.

2. Ecological

a. Problem Formulation: The establishment of the goals, breadth, and focus of the ecological risk assessment, resulting in the ecological conceptual model. The conceptual model describes how the preliminary contaminants of concern might affect the potential ecological receptors, and identifies assessment and measurement endpoints. The problem formulation step is used both for screening purposes and to refine the baseline ecological risk assessment.

b. Analysis Phase: This phase is a combination of the ecological effects assessment and the exposure assessment. The ecological effects assessment includes a final determination of the contaminants of concern, coupled with a compilation of the available toxicity information. The exposure assessment can include estimates of likely exposure scenarios for potential ecological receptors. Alternatively or in addition, the analysis phase may include field measurements of potentially affected populations compared to reference populations, and/or toxicity testing of contaminated media.

c. Risk Characterization: A weight-of-evidence approach is used to interpret results of the field studies and risk estimates for the assessment endpoints. The risk characterization includes a qualitative and quantitative evaluation of the risk results and associated uncertainties.

F. Data Analysis

The Respondent shall analyze all facility investigation data outlined in this Task and prepare a report. The objective of the data analysis section is to summarize the investigation and demonstrate that a sufficient amount of data in quality (e.g., quality assurance procedures have been followed) and quantity has been collected to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the Corrective Measures Study.

TASK IV: REPORTS

At a minimum, Respondent shall prepare a draft and final reports for the following submissions, except Progress Reports. These report shall present the results of Tasks I through III. These reports and any others shall be submitted in accordance with the schedule contained in the Administrative Order and the RFI Workplan, upon its approval:

A. Description of Current Conditions (Task I)

B. RFI Workplan (Task II)

C. RFI Report (Task III)

D. Progress Reports

The Respondent shall, at a minimum, provide the EPA with signed, bimonthly progress reports containing:

1. Description and estimate of the percentage of the RFI and any Interim Measures completed;

2. Summaries of all findings;

3. Summaries of all changes made in the RFI or IMs during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups, or state government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.